

## REMARKS

### Claim Rejections and No *Prima Facie* Case Shown for Claim 39

Claims 25-28, 33-34, 36, and 39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Giri et al. (U.S. 6,765,152) in view of Ahn et al. (U.S. 6,765,152). Claims 29-30 and 35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Giri et al. and Ahn et al. in view of Klein et al. (U.S. 2004/0145051). Claim 31 is rejected under 35 U.S.C. §103(a) as being unpatentable over Giri et al. and Ahn et al. in view of Kikuma et al. (U.S. 6,621,169). Claim 32 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Giri et al. and Ahn et al. in view of Koopmans (U.S. 2004/0035840). Claims 38 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Giri et al. and Ahn et al. in view of Higgins III (U.S. 5,583,377).

As discussed in more detail below, Applicant notes that the Examiner has rejected claim 39 (added in the Amendment of 2/15/06) without citing any teaching from the art which discloses or suggests a metal thermal-conducting layer in the form of a *sputtered metal layer*. As a result, Applicant respectfully requests that the Examiner pull the application from final, so that Applicant may be given the full prosecution period to which the Applicant is entitled, i.e., the Examiner may then provide a specific teaching from the art to which Applicant may then have a full opportunity to respond.

### Claim Amendments

By this Amendment, Applicant has amended claim 25 of this application to recite a flip chip package including, *inter alia*, a dummy die having an exposed surface located on a bottom thereof, the exposed surface having a metal thermal-conducting layer ***directly*** formed thereon ***to substantially cover the exposed surface located on the bottom of the dummy die***. It is believed that the amended claims specifically set forth each element of Applicant's invention in full compliance with 35 U.S.C. § 112 (See, e.g., p. 6, ll. 9-12; Fig. 4), and define subject matter that is patentably distinguishable over the cited prior art, taken individually or in combination. Applicant respectfully requests entry of these

amendments, as they place the application in condition for allowance, as further outlined below.

In the present invention, a dummy die 130, having no electrically calculating function, includes a bottom surface having a high thermal-conducting metal layer 233 configured to dissipate heat from the chip package. It is important to note that, in order to maximize heat dissipation, this metal layer 233 is **directly formed** on the bottom of the dummy die **to substantially cover the exposed surface located on the bottom of the dummy die**. In other words, no solder balls, spacers, pads, etc. separate the dummy die bottom surface from the high thermal-conducting metal layer 233 and most of the bottom surface is covered; to space the die from the metal layer or intermittently cover the bottom surface would defeat the thermal heat dissipating purpose of the metal layer 233. In addition, in one preferred embodiment, the high thermal-conducting metal layer is **formed by sputtering**, a method specifically selected by Applicant to enhance heat dissipation.

The primary reference to Giri et al. discloses a multi-chip module having chips on two sides including a frame (12), a large semiconductor device (22) located above the thin-film structure, a thin-film structure (18), and a plurality of semiconductor devices (20) located below the thin-film structure. The thin-film structure (18) is a soft multilayer polyimide on which the large semiconductor device (22) and the plurality of semiconductor devices (20) are mounted. As admitted by the Examiner, the thin-film structure of Giri et al. is not a dummy die which is a silicon substrate having no electrically calculating function. Giri et al. further teaches that "**chip 20, 22 connect to contact pads 26, 24 by small solder balls**, also known as controlled collapse chip connection (C-4)" (Col. 4, ll.15-18, *Emphasis added*).

The Examiner has argued on p. 3 of the outstanding Office Action that "the dummy die has an exposed surface located on the bottom surface and has a metal thermal conducting layer (layer on the underside of the dummy die where the other chips are formed)." (*Emphasis added*). Since the Examiner has not specifically cited any portion of the Giri et al. which teaches any sort of **metal layer**, Applicant must assume that the Examiner is referring to the only metal structure on the bottom surface of the thin-film structure 18; solder balls and

contact pads 26, as shown in Fig. 4. It is clear from Fig. 4 that of solder balls and contact pads 26 only occupy a very small percentage of the thin-film structure's bottom surface (a feature which clearly is a result of the selective electrical conduction purpose of contact pads and solder balls, as opposed to Applicant's purpose of maximizing heat dissipation with a substantially continuous layer). In addition, Applicant submits that neither "solder balls" nor "contact pads," as understood by the skilled artisan, denote a layer which continuously covers a bottom surface of a die. It follows from the above that solder balls and contact pads cannot be said to be directly formed on the bottom exposed surface of the dummy die to substantially cover the exposed surface located on the bottom of the dummy die. Furthermore, Applicant notes that Giri et al. fail to teach anything about forming the contact pads and solder balls by sputtering.

Giri et al. do not teach or suggest a flip chip package including a dummy die having an exposed surface located on a bottom thereof, the exposed surface having a metal thermal-conducting layer directly formed thereon to substantially cover the exposed surface located on the bottom of the dummy die. Giri et al. also do not teach or suggest a spluttered metal layer on the bottom surface of a dummy die.

The secondary reference to Ahn et al. teaches a silicon interposer substrate (100) used to carry both memory chips (110) and a microprocessor (120).

Ahn et al. do not teach or suggest a flip chip package including a dummy die having an exposed surface located on a bottom thereof, the exposed surface having a metal thermal-conducting layer directly formed thereon to substantially cover the exposed surface located on the bottom of the dummy die. Ahn et al. also do not teach or suggest a spluttered metal layer on the bottom surface of a dummy die.

Applicant maintains the characterizations and arguments in the Amendment of February 15, 2006 with respect to Klein et al., Kikuma et al., Koopmans, and Higgins, III. Applicant further submits that even if the teachings of Giri et al., Ahn et al., Klein et al., Kikuma et al., Koopmans, and Higgins, III were combined, as suggested by the Examiner, the resultant combination does not suggest: a flip chip package including a dummy die having an exposed

Serial No. 10/648,237

surface located on a bottom thereof, the exposed surface having a metal thermal-conducting layer directly formed thereon to substantially cover the exposed surface located on the bottom of the dummy die; nor does the combination suggest a spluttered metal layer on the bottom surface of a dummy die.

Applicant further asserts that, by failing to cite any teaching from the art disclosing or suggesting a sputtered metal thermal-conducting layer the Examiner has failed to show a *prima facie* case of obviousness with respect to Claim 39.

Applicant submits that there is not the slightest suggestion in either Giri et al., Ahn et al., Klein et al., Kikuma et al., Koopmans, or Higgins, III that their respective teachings may be combined as suggested by the Examiner. Case law is clear that, absent any such teaching or suggestion in the prior art, such a combination cannot be made under 35 U.S.C. § 103. Applicant further maintains that neither Giri et al., Ahn et al., Klein et al., Kikuma et al., Koopmans, nor Higgins, III disclose, or suggest a modification of their specifically disclosed structures that would lead one having ordinary skill in the art to arrive at Applicant's claimed structure. Applicant hereby respectfully submits that no combination of the cited prior art renders obvious Applicant's amended claims.

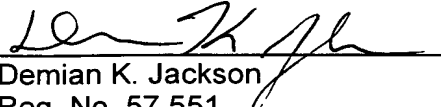
### **Summary**

In view of the foregoing amendments and remarks, Applicant submits that this application is now in condition for allowance and such action is respectfully requested. Should any points remain in issue, which the Examiner feels could best be resolved by either a personal or a telephone interview, it is urged that Applicant's local attorney be contacted at the exchange listed below.

Respectfully submitted,

Date: August 2, 2006

By:

  
Demian K. Jackson  
Reg. No. 57,551

TROXELL LAW OFFICE PLLC  
5205 Leesburg Pike, Suite 1404  
Falls Church, Virginia 22041  
Telephone: 703 575-2711  
Telefax: 703 575-2707

**CUSTOMER NUMBER: 40144**